

The Dental Implications of
Epilepsy.

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The Dental Implications of EPILEPSY

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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This practical report on dental practice and epilepsy is designed to give dentists a fuller understanding of the disease and encourage them to make comprehensive dental health care available to epileptic patients. The report presents current knowledge and recommendations about the management and treatment of the special dental problems of the epileptic. It also underscores the need for research to help attenuate the disease, particularly in obtaining a drug to replace Dilantin.

The Academy of Dentistry for the Handicapped developed the report in 1976 at the request of the Commission for the Control of Epilepsy and Its Consequences.

The Bureau of Community Health Services, which is committed to the provision of high quality dental and medical health care for the handicapped and the medically underserved, is printing this edited version so the report can be made widely available.

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PREFACE

The Commission for the Control of Epilepsy and its Consequences was established, by act of Congress, under PL 94-63, July 29, 1975. Its members were appointed by the Secretary of Health, Education, and Welfare in April 1976.

The Commission was charged with the following responsibilities:

- 1) To make a comprehensive study of the state of the art of medical and social management of the epilepsies in the United States.
- 2) To investigate and make recommendations concerning the proper roles of Federal and State governments and national and local public and private agencies in research, prevention, identification, treatment and rehabilitation of persons with epilepsy.
- 3) To develop a comprehensive national plan for the control of epilepsy and its consequences based on the most thorough, complete, and accurate data and information available on the disorder.
- 4) To transmit to the President and the Committee on Labor and Public Welfare of the Senate and the Committee on Interstate and Foreign Commerce of the House of Representatives, not later than one year after the date of enactment. . . , a report detailing the findings and conclusions of the Commission, together with recommendations for legislation and appropriations as it deems advisable.

In carrying out this mandate the Commission chose to establish the closest possible working relationship with all those governmental and non-governmental agencies whose programs and concerns relate to the person with Epilepsy. As part of this policy the Executive Director of the Commission, Dr. Richard L. Masland, approached the Academy of Dentistry for the Handicapped, in June 1976, with the request that a report be prepared on the Dental Implications of Epilepsy as they relate to the aforementioned guidelines. The then president of the Academy of Dentistry for the Handicapped, Dr. Raymond L. Braham, appointed an ad-hoc committee of those members of the Academy who are most experienced and involved in the subject and, of that committee, five members collected, collated, and documented all the data, which were subsequently reviewed and approved by the whole committee.

This, then, is the report of the ad-hoc committee of the Academy of Dentistry for the Handicapped, set up to study and report on THE DENTAL IMPLICATIONS OF EPILEPSY to the Commission for the Control of Epilepsy and its Consequences. It presents to the best of the committee's knowledge and beliefs, the present state of the art of dental management of Epilepsy, and it makes specific recommendations as to the gaps in dental knowledge and steps which should be taken to correct them.

All requests for further information may be addressed to:

Raymond L. Braham, B.D.S., M.Sc.D.
Past President—Academy of Dentistry for the Handicapped
School of Dentistry, 630-S
University of California
San Francisco, CA 94143

THIS PAPER PREPARED BY

Raymond L. Braham, B.D.S., M.Sc.D.

President—Academy of Dentistry for the Handicapped
Assistant Professor, Pedodontics
School of Dentistry, University of California
San Francisco, CA 94143

Paul S. Casamassimo, D.D.S.

Assistant Professor, Department of Oral Pathology and Diagnosis
College of Dentistry, University of Iowa
Iowa City, IA 52242

Arthur J. Nowak, D.M.D., M.A.

President—National Foundation for Dentistry for the Handicapped
Associate Professor, Pedodontics
College of Dentistry, University of Iowa
Iowa City, IA 52242

William R. Posnick, D.D.S., M.P.H.

Assistant Professor, Department of Dental Ecology
School of Dentistry, The University of North Carolina at Chapel Hill
Chapel Hill, NC 27514

Arnold D. Steinberg, D.D.S., M.S.

Associate Professor, Periodontology
University of Illinois College of Dentistry
Chicago, IL 60612

THE FOLLOWING MEMBERS OF
THE ACADEMY OF DENTISTRY FOR THE HANDICAPPED
CONTRIBUTED SIGNIFICANTLY TO THIS DOCUMENT
AS MEMBERS OF THE ADVISORY COMMITTEE

Merle A. Frankel, D.D.S.
Cleveland, Ohio

Justin H. Stone, D.D.S.
East Orange, New Jersey

Henry L. Kanar, D.D.S.
Ann Arbor, Michigan

Thompson M. Lewis, D.D.S., M.S.D.
Seattle, Washington

Lewis A. Kay, D.D.S.
Haddonfield, New Jersey

Kurt J. King, D.D.S., M.S.D.
Minneapolis, Minnesota

INTRODUCTION

One of the basic principles of democracy is that each person is valuable in his or her own right, so that each individual should have full opportunity to develop his or her total potential. A prerequisite of this lofty ideal is the maintenance of good health, and one of the most important factors in total health is a clean and healthy mouth. If the teeth are decayed and broken down, if the gums are infected, and if the mouth is generally neglected, the individual concerned will be avoided by his or her peers, associates, and society in general. The person with epilepsy is usually fully capable of leading an active and productive life, and it is vital that the dental profession be fully cognizant of the oral health problems of this group and in the position to render total dental care, as with any other patient.

Epilepsy cannot really be considered a disease entity in itself; rather it is a symptom of an underlying brain disorder which manifests in a seizure. The terms "Epilepsy" and "Recurrent Convulsive Disorder" can be used interchangeably to describe a group of symptoms which are characterized by recurrent sudden attacks of unconsciousness. These attacks are usually of brief duration and are often accompanied by muscular spasms and other abnormal behaviors.

In early school years the prevalence of epilepsy may be as high as one percent to two percent of the population. The overall prevalence of persons suffering from recurrent seizures, or requiring medication, is approximately one-half percent. Almost fifty percent of all patients with the spastic type and around twenty-five percent of those with the athetoid type of cerebral palsy exhibit this symptom. Seizures are more common in children than in adults. Included in this group are the very young who exhibit convulsions and a sudden rise in temperature, associated with a febrile condition.

It has been singularly difficult to locate any really valid figures regarding the dental needs of the portion of the population suffering from epilepsy. Statistics for the United States in general show that thirty-seven percent of children at age six years, rising to ninety-four percent of those at age twelve years, have some dental caries present in their permanent dentition. Ninety-nine percent of patients in all age groups require some form of dental care. Forty percent of so-called 'normal' patients in the United States are receiving good comprehensive dental care; therefore it may safely be estimated that only twenty percent of all patients with epilepsy are receiving adequate dental care, bearing in mind the special nature of the care for the patient with epilepsy.

The average dentist, when asked to discuss the oral significance of epilepsy, will launch into the problems of dilantin hyperplasia and probably will talk about placing a wedge between the posterior teeth to prevent tongue-biting. Nothing could be further from the total picture. In addition to the more commonly associated problems of dilantin hyperplasia and seizures in the dental office, the person with epilepsy may suffer from other less known, but equally significant oral problems and complications. Trauma, response to anticonvulsant medication, treatment precautions, and accidents such as aspiration of foreign bodies are just a few of the significant problems in the dental treatment of the patient with epilepsy.

TRAUMA AND ATTENDANT PROBLEMS

Both the medical and dental literature on epilepsy, of recent years, are replete with warnings against improper intervention by "would-be-Samaritans" in cases of seizure,^{1, 2, 3} but there is still periodic reporting of fractured teeth,² broken jaws,⁴ facial lacerations, and aspirations of tooth or appliance fragments.⁵

In a significantly large proportion of patients with epilepsy, dental treatment creates no specific problems, since they are on anticonvulsant therapy and are well controlled. However, many do not have adequate seizure control, even with drug therapy. Dental treatment can induce apprehension and fear in these patients and with certain stimuli, such as bright lights or certain smells, may trigger a seizure in the dental office. It is, therefore, imperative that the dentist know the extent to which the patient's seizures are controlled. This information should be obtained, not only from the patient, parents, and relatives, but also by personal contact with the physician treating the case. Additional sedation or an increase in the dosage of anticonvulsant drugs may be considered in order to maintain control during the course of the dental treatment. This should be decided in consultation with the patient's physician. It must also be borne in mind that administration of additional medication, for this purpose, will probably require a period of build up.

GENERAL MANAGEMENT OF SEIZURES IN THE DENTAL OFFICE

If a grand mal seizure occurs in the dental office, it is important that all office personnel be familiar with the necessary procedures to cope with the situation.³

The patient should be immediately placed in such a position that he or she cannot fall or come into contact with furniture or equipment. An exception to this rule is that if the seizure occurs in the dental chair, no attempt should be made to move the individual out of the chair during the actual seizure. The chair should be lowered and tilted back, and instruments and equipment that might prove injurious should be moved out of the way. Often the attack will be preceded by an aura and the patient will be able to warn the dentist to move him to a safer position. During the seizure the patient should be placed on one side with the head in a position to prevent aspiration of saliva. Many advocate the placement of a bite block or similar soft material between the teeth to prevent tongue biting. Experiences in epilepsy clinics have shown that it is very difficult to place anything in the mouth during a seizure and such intervention tends to produce trauma rather than prevent it. While tongue biting during a seizure does occur in some cases, more damage is caused by forcing objects between the teeth. If the dentist is alert and familiar with the sequence of events in a grand mal seizure, he or she can intervene at the very beginning of the attack when the mouth is wide open. At this point it is possible to place a piece of towel between the teeth. To attempt to force anything between the teeth after this is highly dangerous.

During a sudden attack in the dental chair an instrument may become clamped between the patient's teeth. No attempt should be made to remove it forcibly. The dentist should wait alertly until the seizure subsides and the object can be removed without injury to the patient. A length of dental floss tied around the bow of a rubber dam clamp will preclude its loss in the oro-pharynx in the event of a sudden seizure.

After the seizure is over the patient will be unconscious for a short period of time. When the patient recovers, he will have a headache and be mentally confused; further dental treatment should be postponed.

Seizure management varies, and not all types of seizure will necessitate special treatment. Petit mal seizures have no associated convulsions and the only sign may be a vacant look in the eyes or facial pallor. It is advisable in these circumstances to discontinue treatment momentarily until the patient returns to a normal state of consciousness. The general rule to follow if a grand mal seizure occurs is to try to prevent the patient from inflicting self-injury.

TREATMENT OF TRAUMA

The dentist's role in the treatment of trauma, whether self-inflicted or caused by over-zealous intervention, is usually to administer palliative care and restore damaged teeth.

Soft tissue injury can be either intra- or extra-oral. Treatment usually is routine for the contusions, abrasions, and lacerations that may occur. Facial contusions are best handled by observation, but fracture of underlying bone and intra-oral structures must be considered.

Abrasion can be managed by thorough cleansing with soap and water to remove debris followed by application of an antiseptic. Subsequent formation of an eschar will help to promote rapid epithelialization and healing. Lacerations should be treated immediately and demand thorough cleansing, debridement if necessary, hemostasis and wound closure.⁶ As with all soft tissue wounds, clinical examination of underlying structures is indicated. Radiographic examination may also be necessary.

During a seizure the tongue is vulnerable to injury, and biting may cause a partial or complete puncture of that organ. Primary considerations are hemostasis and wound closure. Infection is not usually a problem. Sutures may be necessary if trauma is severe.

Hard tissue injury is either osseous or dental in nature, and both demand immediate attention. Treatment of maxillary and mandibular fractures should be the responsibility of the oral surgeon, due to such complications as poor oral hygiene, diphenylhydantoin hyperplasia, missing teeth, and repeated trauma. Proper treatment of fractures in a patient suffering from epilepsy can be a comprehensive management situation beyond the scope of the general dentist.

Tooth fracture or loss, as a result of seizure, should be handled in much the same way as in a routine fracture case, with the following additional considerations:

1. *Location of the tooth or tooth fragment is imperative, because aspiration may lead to respiratory distress.*² This is a potential hazard, but location of the tooth or foreign body can preclude bronchoscopy or surgery.
2. *Immediate treatment of the injury demands greater attention to the interim or temporary replacement because of the danger of repeated trauma.* In the routine fracture patient, protection of the dental pulp, space maintenance in the case of lost teeth, esthetics and function are major considerations in temporary treatment. In the patient with epilepsy, however, these considerations may become secondary to the epilepsy and possibility of seizure prior to permanent restoration. For example, an Ellis Class 2 fracture of the crown of the tooth involving enamel and dentin may be best treated initially with a stainless steel crown with a synthetic facing, rather than with a more esthetic but weaker acrylic replacement. An avulsed tooth which is lost may best be treated by not replacing it immediately. A temporary one-tooth acrylic fracture, subject to fracture in a seizure, might pose a distinct hazard to the patient. Individual treatment will require consideration of seizure control, the interval between temporary and permanent restoration, the severity of epilepsy, and the cooperation of the patient.
3. *Fixed prosthetic appliances are preferable to removable ones.* The fixed appliance offers a preventive function in that it is more stable and less easily dislodged than the removable type. Partial dentures, especially those with acrylic bases and teeth, are subject to fracture and possible aspiration. Very little appears in the literature about aspirated dentures, but there is at least one report of aspiration of broken retentive clasps which had to be surgically removed from the lungs.⁵

4. *If removable partial or complete dentures must be used, then the partial dentures should be of cast metal as much as possible and the full dentures should be reinforced with mesh to prevent shattering.* Baczkowski,⁸ has worked extensively with full and partial prostheses for patients with epilepsy and has had success with acrylic appliances reinforced with a polyamide net. The net or mesh keeps the fragments together and prevents aspiration. He also prefers cobalt-chrome steel castings⁹ to acrylic, whenever possible, because the metal is highly resistant to fracture. It can also be made thinner and causes less mucosal irritation than acrylic.
5. *Prosthetic replacement of teeth can serve a preventive function in addition to replacing lost teeth and restoring occlusion.* There is at least one report in the literature in which the replacement of teeth with a partial denture stopped seizure-associated tongue-biting.¹⁰ Spasmodic closure of partially edentulous ridges is analogous to the meshing of cogged gears and can be devastating to the tongue. Well designed and constructed dentures can deflect the cheek, allow space for the tongue, and prevent unnecessary trauma.
6. *Instructions to patients with complete or partial dentures must include warnings and precautions on what to do in case of seizure in addition to usual care and use of dentures.* For the completely edentulous epileptic patient of normal mentality, and without other complications, complete dentures do not present a risk.¹¹ An oncoming seizure can often be sensed by the patient who can remove the dentures. Companions who are versed in proper first aid for seizures should also be instructed in the removal of complete dentures in the event of a seizure. Partially damaged or fractured dentures should be replaced or repaired as soon as possible and not worn in a weakened condition. Patients should be taught the signs of aspiration, be able to determine if aspiration has occurred, and encouraged to seek immediate help.

SIGNIFICANT ALTERATIONS IN CLINICAL FINDINGS

A. The Effects of Anticonvulsant Medication

Much has been written about the effect of diphenylhydantoin on gingiva, but only recently has attention been drawn to various other effects of long-term anticonvulsant therapy. The following alterations in normal physical findings have been noted in the literature:

1. *Thickening of the calvarium.* Several studies have noted the effect of long-term anticonvulsant therapy on bone. Falconer and Davidson¹² found coarseness of features and thickening of the cranial vault in a study of twins in which one member of each set of twins was receiving anticonvulsant medication. LeFebvre et al¹³ studied a larger sample of institutionalized subjects receiving anticonvulsants and found definite cranial and facial changes in a third of the group, with possible changes in another third.

2. *Coarseness of facial features.* Israel¹⁴ and other authors^{12, 13} have noted alterations of the facies of patients on anticonvulsants. Swelling of lips, broadened nose, and a general thickening of subcutaneous tissues of the face are among the findings reported. Israel reports that pathological bone has been associated with treatment by phenobarbital, primidone, and dilantin. The complete significance of such findings is not known, but long-term anticonvulsant therapy at an early age may have a profound effect on the developing skull, craniofacial growth, position of teeth and supporting bone.

3. *Root abnormalities.* There is some evidence that the teeth may be affected by long-term anticonvulsant therapy. Richens and Rowe,¹⁵ have noted a disturbance in calcium

metabolism as a result of anticonvulsant therapy. Harris and Goldhaber¹⁶ reported significant root abnormalities in a group of 112 patients with epilepsy who were receiving anticonvulsant therapy. The abnormalities ranged from marked resorption to stumpy shortening. These findings are characteristic of pseudo or idiopathic hypoparathyroidism.

4. *Drug reactions.* A number of untoward effects of anti-epileptic drugs have been reported in the literature. Reactions to barbiturates include severe stomatitis,¹⁷ and acute toxic epidermal necrolysis.¹⁸ Stomatitis can present with patchy ulceration on all oral soft tissue and a patchy Nikolsky sign (this is a denudation of the epidermal layer when rubbed), even in the absence of other body lesions. Toxic necrolysis gives a scalded appearance and offers a prodromal phase of fever, malaise, irritability, and generalized body erythema. In the base of necrolysis, oral manifestations may indicate a poor prognosis. Stevens-Johnson syndrome, or erythema multiforme exudativum, has been noted following diphenylhydantoin therapy.¹⁹ This condition is manifested by fever, lethargy, swollen gingiva and vesicular lesions on lips gingiva and mucosa. Generalized or localized dermatologic reaction to dilantin may also occur. In these cases, skin lesions can also be of the erythematous, scarlatiniform, or morbilliform type,²⁰ and pigmentation resembling chloasma has been noted.

Cutaneous lesions are rarer with other drugs. Mysoline has been reported to cause painful gingiva.²¹ Drowsiness has been found to be a common side effect of most anticonvulsant drugs, and this may present problems with routine dental treatment that require an alert, responsive patient.

B. Other Non-Drug Related Associations

1. *Dental hypoplasia.* Some attention has been given to the possible relationship between epilepsy and dental hypoplasia, but according to a study by Risch et al,²² the relationship is not significant.

2. *Congenital partial hemi-hypertrophy.* Hanley et al,²³ have reported three cases of hemi-hypertrophy of the face with associated seizures.

DIPHENYLHYDANTOIN GINGIVAL HYPERPLASIA

Estimates indicate that some two million persons in the United States are receiving dilantin medication.

The most common side effect of prolonged dilantin therapy is the occurrence of gingival hyperplasia as a distinct pathological entity. Depending on the study quoted, its incidence ranges from thirty-two percent to eighty-four percent of those patients taking the drug on a long-term basis. A more accurate estimate of the incidence is approximately twenty-five percent, with the degree of hyperplasia being so severe in about thirty percent of the affected patients as to warrant surgical intervention to alleviate the problem. The occurrence of the hyperplasia after initiation of the drug therapy can vary from a few weeks to a few years. Anything in the mouth that is responsible for irritation of the soft tissues, such as orthodontic bands or overhanging margins on poorly contoured dental restorations, will tend to encourage the overgrowth of the gingival tissues onto the teeth. Dilantin is the only drug known to produce such an unusual side effect. Aas,²⁴ in an extensive review and study, substantiated several important factors relating to the epidemiology of dilantin hyperplasia. He showed that there was no evidence of a sex factor in the occurrence of the condition. Also, the prevalence of hyperplasia was found to be higher in the younger age groups than in the adult population. There was a significant relationship identified between the dosage and duration of the medication and the degree of hyperplasia tissue found in the affected subjects.

In seventy-five percent of all cases examined, Aas found the overgrowth to be most marked in the anterior region. This is consistent with the findings of Panuska et al,²⁵ who found the areas of the mouth affected, in order of severity, to be: maxillary anterior facial, mandibular anterior facial, maxillary posterior facial, and mandibular posterior facial. The labial or buccal surfaces of all teeth have a greater incidence of hyperplasia than the lingual. The degree of severity of the gingival hyperplasia may vary within the same individual and both normal and pathological areas may be found in the same mouth. No hyperplasia changes are usually observed in edentulous areas.

Some of the proposed etiologic factors responsible for this reaction to dilantin include allergic reaction, and indirect effect on the adrenal glands. To date none of the many theories have satisfactorily explained this phenomenon.

Treatment for gingival hyperplasia is limited. The most satisfactory procedure is the replacement of dilantin with another drug in the anti-convulsant group. This, of course, can only be done in consultation with the patient's physician and must be weighed against possible deleterious effects from changing the drug therapy. Elimination of dilantin will produce some regression in the degree of hyperplasia within a few weeks. However, in any long-standing lesions the tissue will be very fibrotic and surgical correction will be necessary.

Use of vitamin C, antihistamines, diuretics, local application of corticosteroids, and alkaline mouthwashes have been used in attempts to eliminate lesions. None of these treatments has been successful. A number of investigators have found a relationship between the degree of hyperplasia and the state of oral cleanliness. While improved oral hygiene does decrease the size of the hyperplastic tissue, perhaps by eliminating secondary inflammation, it will not totally eradicate existing lesions. There have been several reports in the literature indicating that the maintenance of exceptionally good oral hygiene will prevent irritation of gingival hyperplasia. Work with experimental animals suggests that irritation is also a prerequisite to initiation of the condition.

Within recent years, a few reports have been published indicating that the use of a pressure appliance has helped to reduce and retain the growth of the gingiva.²⁶ This appliance is usually used immediately after gingival surgery has been performed to eliminate the hyperplastic tissue. An appliance very similar to a white rubber tooth positioner is constructed to adapt very closely to the gingiva. The patient is instructed to wear the appliance three hours during the day and all night. The results of such treatment, after surgical correction of the defects, have proven to be fairly successful, especially in the cooperative patient who also maintains the most meticulous oral hygiene. One of the authors of this monograph, (ADS), has used this appliance in several cases in which severe overgrowth of the gingival tissues had occurred, and where surgery was contra-indicated. In these cases the use of the positive pressure appliance with stringent oral care was able to decrease the size of the lesion by almost fifty percent.

When the severity of the hyperplasia is such that esthetics is a problem, mastication is impaired, and oral hygiene procedures have not succeeded in preventing the overgrowth of the gingiva, surgical elimination of the hyperplastic tissue is indicated. It must be noted that surgery is not a final nor a permanent solution to the problem, since the hyperplasia invariably recurs and progresses to its previous intensity within a relatively short period of time if the patient continues on dilantin therapy. Scrupulous oral care and use of the positive pressure appliance will help delay, or even prevent, recurrence of the gingival hyperplasia.

PROBLEMS IN DENTAL TREATMENT

A. Medications and Drug Interactions

Most patients suffering from epilepsy will be taking medication for their condition. Since dental treatment today involves the use of many drugs which can interact with anti-convulsant medication, the dentist must be aware of a patient's current medication, dosages, side effects and interactions, (Table 1). For example, phenytoin (diphenylhydantoin) levels in the blood are increased by isoniazid, disulfiram, and bishydroxycoumarin.²⁷ Barbiturates have an unpredictable effect on the metabolism of phenytoin; they may increase it or decrease it.²⁸

B. General Anesthesia

Although general anesthesia is not necessary for treatment of all patients with epilepsy it may be required in certain cases, such as those involving very extensive treatment, management problems, or associated systemic illness. Some precautions are necessary. Bennett et al²⁹ reported abnormal electroencephalographic features in six brain-damaged epileptic patients during ketamine anesthesia. There were focal seizures in some of these patients up to three months post-operatively. Methohexital has also been implicated as a cause of seizure in certain patients suffering from epilepsy.^{30, 31} Caution is recommended when using this agent for dental anesthesia. It is advisable to consult with a highly competent anesthesiologist when general anesthesia is contemplated for dental procedures.

PREVENTION OF DENTAL DISEASE IN THE PATIENT WITH EPILEPSY

Although many reactions may be of concern to the physician who treats the epileptic patient, it is the dentist who is consulted frequently to treat the problem of gingival hyperplasia associated with the use of dilantin.

There is conflicting evidence with regard to the incidence of dental caries in patients with epilepsy. Esterberg and White³² report a low caries frequency in their population of patients, while Nash³³ and Blake³⁴ described a high caries activity. Aas,²⁴ in a comprehensive study of 177 patients suffering from epilepsy, reported a caries incidence lower than one would expect to find in a similar non-affected group, predominantly under the age of 19 years.

Although there have been conflicting reports as to the incidence of dental caries in patients with epilepsy, there is unanimous agreement about the wide prevalence of periodontal disease. The type and the severity of periodontal disease have been reported primarily in those patients receiving diphenylhydantoin. Angelopoulos and Goaz³⁵ reviewed the literature from 1939 until 1972, and found that the reported incidence of hyperplasia varied considerably among investigators. The incidence varied from no hyperplasia to a high of 84.5 percent in one population studied.

The authors reasoned that this marked disparity was due to the fact that many of the authors listed in the studies were physicians who were not consistent in their description of the changes in the morphology of the gingiva. Other causes for the disparity included the reliability of the data-collecting process which was questionable since, in many of the studies, detection of gingival hyperplasia was not the primary objective of the study. The number of observations was small and therefore of limited statistical value. Finally, the lack of a universally established set of criteria for the evaluation of the gingival hyperplasia added to the disparity.

Among their conclusions, the above authors reported that sex, age, dosage level and duration of treatment were not found to be associated with the development of hyperplasia. There did appear to be some clinical evidence to indicate that good oral hygiene was of considerable importance in the maintenance of normal gingiva during treatment.

In general, the prevalence of dental caries is as widespread in the population suffering from epilepsy as in the non-affected population. For those patients on diphenylhydantoin, the severity increases proportionately because of the hyperplastic gingival tissues and concomitant:

- a) malalignment and rotation of the teeth
- b) retention of food, debris, and plaque in the mouth
- c) unpleasant cosmetic appearance
- d) production of malodor

A comprehensive preventive and restorative dental program, initiated prior to or immediately at the time of drug therapy, should be *mandatory* for all diagnosed epileptic patients.

IDEAL DENTAL CARE

To be healthy one must be able to eat, smile, speak and feel well, and all of these requirements involve the oral cavity. If the gingivae are sore, swollen and red, the breath unpleasant, and the overall appearance of the opened mouth unattractive, one will not only be unhealthy but will also have a poor self-image. He will have difficulty interacting with friends as well as other acquaintances. A healthy, attractive and well-functioning oral and masticatory apparatus is paramount to optimal health and social interaction.

Adequate dental care begins early, with the initial visit to the dentist no later than six months after the first tooth erupts.³⁶ At this visit, the parents of the child should be advised and instructed in tooth cleaning methods, positioning and stabilizing the child, fluoride supplementation if the communal water supply is not optimally fluoridated, and the role of diet and dietary habits in the initiation of dental disease. Based on the child's medical condition and the dental history of the parents and siblings, a recall maintenance schedule should be recommended. As the child develops, the dentist should continue to provide preventive and restorative guidance when necessary.

With this kind of regimen, the child should progress to a full permanent dentition with minimal restorative needs and a healthy well-functioning mouth. If there is injury to the teeth and jaws, because of a traumatic incident, or if there is an inherited malocclusion, additional dental intervention may be necessary.

Once daily personal care of the teeth is established and periodic evaluation and treatment by the dentist becomes a habit, the patient will be able to function throughout life in an optimum state of health.

MODIFICATION OF THE IDEAL WHEN THE HEALTH OF THE PATIENT IS ALTERED

When a patient's health is affected by trauma, infection, genetic factors, neoplasia, developmental disorders, or idiopathic disease, there must be modification of the procedures for management of the oral health.

When a convulsive disorder is diagnosed and anticonvulsant therapy is instituted it is imperative that the patient be immediately referred to a dentist who is knowledgeable in the

management of this type of patient. Whether the patient be six months or forty years old, a comprehensive preventive and restorative plan must be outlined and initiated *immediately*.

Because dilantin is the most widely used anticonvulsant drug, and because one can predict, with reasonable accuracy, that at least 50 percent of the patients will have some degree of gingival hyperplasia,³⁷ methods to remove *all* dental plaque from the teeth must be mastered by the patient.

Plaque Removal

With the pediatric patient and patients with handicapping conditions superimposed on their convulsive disorder, it will be necessary to teach methods of plaque removal³⁸ to parents and guardians, or the aides and orderlies if the patient is in an institution.

The adolescent and the adult should be given instructions in the removal of plaque, and their effectiveness evaluated by responsible siblings, parents, paraprofessionals, and professionals.

Devices to be used in plaque removal will vary depending upon the ability of the patient, but should include disclosing agents to visibly demonstrate plaque; the multi-tufted, round-tipped, soft toothbrush, dental floss with or without a floss-holder, water irrigating devices, and rubber or soft wood stimulators.

The parents or guardians of a pediatric patient should be taught how to place the child in a supine position in order to increase visibility in the mouth and to give better control. The cleaning may be carried out in the bedroom or living room, if the light is suitable to illuminate the oral cavity. Because a dentifrice is NOT ESSENTIAL to clean the teeth and need not be used, expectoration and the need for a sink can be eliminated.

In the case of a handicapped patient with uncontrollable movements, or the patient who is difficult to manage, two or more persons might be required to clean the teeth thoroughly. If so, the patient can be restrained by one person and the mouth opened by the judicious use of a prop while the teeth are cleaned by the other.

Although there are many methods of brushing, there is no one method for everyone. Nevertheless, the vibratory or sulcular technique, as described by Bass,³⁹ appears to be gaining wide acceptance by the majority of clinicians. In this method, the bristles of the soft, multitufted brush are directed at 45° to the teeth and gingivae and then vibrated while moving the brush in a horizontal direction across the teeth. It is best to progress in a systematic fashion around the mouth so that no surface is missed.

Brushing only removes plaque from three of the five tooth surfaces. To remove the plaque from the proximal surfaces of the teeth, dental floss must be used. It has been found that a floss holder facilitates the flossing process. If a holder is not used, it is most important to pass the floss very carefully between the teeth. The floss should be advanced in a gingival direction and then passed up along one surface of the tooth and back down again in a back and forth motion to repeat the process on the other surface.

When disclosing agents reveal that brushing and flossing alone do not remove all the plaque, then the rubber or wooden stimulator can be used to scrape residual plaque, near the gingival crevice, from the teeth. In addition, the water irrigating device may be used to irrigate the crevice and stimulate the tissues.

Frequency of cleaning is dependent upon the patient's ability to attain a thorough and complete result. Although many authors have suggested from one to five times a day, frequency is dependent upon the patient and the severity of the disease. At the minimum, the teeth must be thoroughly cleaned at least once a day, preferably prior to retiring at night.

FLUORIDE THERAPY

The use of fluorides continues to be the most effective and widely-used method of preventing dental caries. Fluoride is effective systemically as well as topically through communal water supplies, dietary supplements, dentifrices, solutions, gels, pastes, and rinses.

The effect of fluoride has been reported to be caused by its ability to adversely affect micro-organisms in the plaque and modify the physiochemical properties of the teeth and surrounding environment.

The most effective, and least expensive, method for fluoride administration is through the community water supply. Even so, as of December 1975, only one hundred million of the estimated two hundred and twelve million citizens of the United States were benefitting from fluoridated water.⁴⁰ For those not in a community with optimally fluoridated water, systemic fluorides should be prescribed. A fluoride supplement schedule has been suggested for handicapped patients, based upon age and concentration of fluoride in the water.³⁸

Age	Concentration of fluoride in water, (ppm)		
	Less than 0.3	0.3 to 0.7	More than 0.7
0 to 6 months	0.25	0	0
6 months to 3 years	0.50	0.25	0
3 to 6 years	0.75	0.50	0.25
6 to 18 years	1.00	0.75	0.50
Over 18 years	1.00	1.00	1.00

Fluoride supplement schedule, (mg/day), for *handicapped patients* based upon age of patient and concentration of fluoride in water.

It is also recommended that fluorides be applied to the teeth semi-annually by the dentist. For high risk patients, self-applied topical fluoride agents have been shown to be effective, especially when used frequently. These fluorides can be applied in mouth rinses, brushed on as gels, chewed as lozenges, or applied in custom-fitted trays. Any of these intensive fluoride therapies must be closely monitored. When clinical signs of caries arrest and improved oral health are observed, consideration should be given to termination of this intensive therapy.

Pit and Fissure Sealants

Removal of plaque and use of fluorides are most effective in reducing caries on smooth surfaces. The occlusal surfaces are very difficult to keep free of plaque because of their deep anatomy. Methods are now available to seal these surfaces with acrylic resins. The enamel is first treated with a mild acid to "etch" the surface, and improve the retention of the acrylic. The earlier the age the sealant can be applied to the teeth, the more pronounced will be the caries reduction.

Dietary Habits

Dental plaque is most important in the initiation of caries and periodontal disease. For plaque to develop in the mouth, bacteria and a suitable substrate are necessary. The substrate is provided partly by the food that enters the oral cavity. Therefore it is most important that dietary regulations be initiated as part of the comprehensive preventive program.

Carbohydrates (especially sucrose) with physical properties that will readily allow them to adhere to the teeth are frequently implicated in the dental disease process. There is evidence to support the increased production of plaque⁴¹ and modification of plaque quality with the increased frequency of carbohydrate consumption.⁴² It is most important to emphasize to the patient that the frequency of carbohydrate intake must be reduced. Therefore snacking must be modified to include foods low in sucrose, and such foods as sucrose-free liquids, fruits, vegetables, meats and cheeses.

Dietary counseling based on a five-day intake analysis must be provided the patient. The counseling should be focused primarily on the balance and adequacy of the diet, a decrease in sucrose intake and frequency, and consideration of the physical properties of the foods recommended. If major nutritional deficiencies are noted, consultation with the patient's physician is indicated.

OTHER CONSIDERATIONS

If the epileptic patient has many carious, fractured or missing teeth, it is most important that these teeth be restored or replaced. Should the patient be taking dilantin, the likelihood of gingival hyperplasia is great. Initially, the conservative approach is indicated. Instructions in plaque removal and deep scaling and curettage should be provided before gingival surgery is considered.

If surgery is planned to remove the hyperplastic tissue, success will depend upon the continuation of dilantin and the ability of the patient to keep the teeth free of plaque. Therefore it is essential that the dentist consult with the physician to insure that the dosage is at the lowest possible level in order to maintain the patient free of convulsions. Demonstration and cooperation in plaque removal by the patient, parent, or guardian is mandatory before any surgery is considered. If these conditions are not met, it is quite possible that the hyperplasia will recur.

SUMMARY

Westphal³ lists economic difficulty, transportation problems, risk of seizure and possible treatment delay as factors which make the dentist reluctant to treat the patient with epilepsy. However, if a dentist would treat this type of patient, he must consider factors beyond those mentioned by Westphal. Restoration of damaged teeth and fractured jaws demand additional considerations in the patient suffering from epilepsy.

Routine examination of the controlled epileptic patient may reveal abnormal cranial, facial, and dental findings. The dentist must be aware of the drug complications possible with anticonvulsant therapy, and may be required to alter his approach to therapy.

Dental disease in the epileptic patient is as prevalent as in any patient of the unaffected population. When the drug, diphenylhydantoin, is administered there is an increase in the incidence of gingival disorders, food and plaque retention, malalignment and rotations of teeth, unpleasant cosmetic problems, decreased masticatory function, and production of halitosis.

A comprehensive preventive program, based upon the following, is mandatory:

- 1) daily removal of dental plaque
- 2) modification of dietary habits
- 3) optimal topical and systemic fluoride supplementation
- 4) sealing of deep pits and fissures
- 5) restoration of carious and fractured teeth
- 6) frequent recall examinations
- 7) re-evaluation and motivation

For the dental program to be effective, it must be initiated immediately after the disorder is diagnosed by the physician. Only then can the patient with epilepsy be assured the comfort of a healthy mouth and the associated pleasures of eating, speaking, smiling, and social interaction.

GAPS IN KNOWLEDGE, FROM THE DENTAL STANDPOINT, AND RECOMMENDATIONS

Perhaps the single biggest question in regard to the dental problems of epilepsy is that of diphenylhydantoin gingival hyperplasia. In spite of the massive volume of literature on the subject, much remains still unknown.

Funds should be made available to continue essential and important research into this disfiguring problem. It has been proven that scrupulous attention to oral hygiene, of itself, will not resolve the problem. Therefore, in the handicapped, especially with cerebral palsy patients and the mentally retarded, the problem of poor oral hygiene superimposed upon dilantin hyperplasia becomes one of major proportions.

Further investigation of the Positive Pressure Appliance should be undertaken, since it has been shown to be of definite value.

Preventive dentistry and oral hygiene programs should be funded on an educational basis. Alternatives to dilantin need to be found. Unfortunately, although the majority of physicians will readily cooperate when problems such as dilantin hyperplasia are pointed out, dilantin is to epilepsy what aspirin is to fever and rheumatic problems in terms of wide spread use and choice as *the* drug for epilepsy. The patient with epilepsy should be treated, easily, in the traditional dental setting, so long as there are no complicating factors beyond epilepsy itself.

EDUCATIONAL PROGRAM PROPOSAL

Dental Care for the Patient with a Seizure Disorder

Goal: To improve the availability and accessibility of dental care for the individual with a seizure disorder.

Plan: An educational program, designed to increase the level of knowledge within the professional community, relating specifically to the dental problems of the individual with a seizure disorder.

Target Population: Dentists, Physicians, Allied Health Personnel.

Provided sufficient support and funding were made available, the ACADEMY OF DENTISTRY FOR THE HANDICAPPED would undertake the following projects as part of a National and Regional Program:

1. Publication of a comprehensive bibliography relating to the dental aspects of seizure disorders.
2. Identify research needs in the prevention and treatment of oral manifestations.
3. Publish and distribute to the whole dental profession a monograph based upon the foregoing dissertation and stressing the concepts of:
 - a) Early consultation
 - b) Preventive philosophy
 - c) Dental management guidelines
 1. Patient management
 2. Treatment

TABLE 1**
Antiepileptic Drugs

Drugs of choice	Indications	Usual adult maintenance dose, mg./day and dose range	Side effects and adverse reactions
Phenytoin—new generic name for diphenylhydantoin (Dilantin)	generalized convulsive seizures, all forms of partial seizures; often in combination with primidone and/or phenobarbital	300 (200–300)	drowsiness, gastric distress, gingival hyperplasia, rash, megaloblastic anemia, ataxia, diplopia, fever, hirsutism.
Phenobarbital (Luminal)	generalized convulsive seizures, all forms of partial seizures; often in combination with phenytoin	90 (60–400)	drowsiness, rash, ataxia
Primidone (Mysoline)	generalized convulsive seizures, all forms of partial seizures; often in combination with phenytoin and/or phenobarbital	750 (500–1500)	gastric distress, nausea, vomiting, anorexia, dermatitis; drowsiness, blood dyscrasias
Alternative Drugs			
Carbamazepine (Tegretol)	generalized convulsive seizures, partial seizures, especially psychomotor; also used for treatment of trigeminal neuralgia	800 (600–1600)	Headache, drowsiness, feelings of inhibition, gait disturbances, blood dyscrasias
Mephenytoin (Mesantoin)	generalized convulsive seizures; all forms of partial seizures	300 (300–800)	drowsiness, rash, blood dyscrasias
Mephobarbital (Mebaral)	Same as phenobarbital		drowsiness, gastric distress, rash
Trimethadione (Tridione)	generalized nonconvulsive seizures—petit mal, myoclonic and akinetic; often used with phenytoin and phenobarbital	900 (900–2400)	drowsiness, gastric distress, rash, hemeralopia, blood dyscrasias, nephrosis
Paramethadione (Paradione)	generalized nonconvulsive seizures, especially petit mal; sometimes useful for psychomotor seizures	900 (900–2400)	gastric distress, rash, photophobia, blood dyscrasias
Methsuximide (Celontin)	generalized nonconvulsive seizures, especially petit mal; sometimes useful for psychomotor seizures	900 (600–1200)	ataxia, drowsiness, headaches, anorexia, blood dyscrasias
Phensuximide (Milontin)	generalized nonconvulsive seizures, sometimes useful for psychomotor seizures	3500 (1000–4000)	dizziness, hematuria, nausea, rash

TABLE 1 (Continued)

Alternative Drugs	Indications	Usual adult maintenance dose, mg./day and dose range	Side effects and adverse reactions
Phenacemide (Phenurone)	Only used in resistant cases because of toxicity; all types of seizures, especially psychomotor	3000 (1000–6000)	Liver damage, psychotic behavior, nausea, rash
Acetazolamide (Diamox)	Sometimes useful for petit mal seizures; in all seizure disorders as an adjuvant to control seizures related to menstrual cycle	750 (500–1000)	anorexia, dizziness, drowsiness
Dextroamphetamine Sulfate (Dexedrine)	Some therapeutic effect in petit mal; used with some Antiepileptics to counteract sedative effects	(15–30)	anorexia, irritability, insomnia

****After Bruya and Bolin: *Epilepsy: A Controllable Disease, Part II, Drug Therapy and Nursing Care*, Am. J. Nurs. 76(3):393-397, March, 1976.**

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